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EFFECT OF EARNINGS ANNOUNCEMENT ON SHARE PRICES ON COMPANIES LISTED AT THE GHANA STOCK EXCHANGE

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Abstract

Earning announcement information plays a very important role in the functioning of stock markets both at individual and institutional investor levels. Stock market reaction to earnings announcement has received significant attention in Finance. Price of a security reflects all available information in an efficient market. In an efficient market, share price is a good estimate of the value placed on the security by the market at any point in time and hence abnormal volatility resulting to abnormal gains cannot be witnessed. The ability of the emerging markets like Ghana Stock Exchange to impound financial information and incorporate it into prices to match the risk is in doubt, therefore the need to establish the effect of earnings announcements on share price changes for companies listed at the Ghana stock exchange. This study examined the effects of earnings announcement on share prices of companies listed on the Ghana Stock Exchange from period of 2014 to 2017. The population size was all listed companies on GSE. A sample of 10 listed companies were selected and 40 documented earnings announcements were collected from 2014 to 2017. The market model was employed in determining the abnormal returns within the 21days event window including 10days pre-event and 10days post-event after earnings announcement. The level of volatility was also tested around the announcement day. The results showed significant abnormal returns and cumulative abnormal returns around the announcement day at 95% confidence level and they are consistent with efficient market hypothesis. It suggests that Ghana stock market is efficient, and earnings announcement has effects on share price. The results also found evidence of high volatility level around the announcement day.

Keywords
Earnings Announcement, Share Prices, Abnormal Returns, Ghana Stock Exchange.

Additional information

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1. INTRODUCTION

1.1. Background of Study

Stock market reactions to earnings surprises has been an important topic in Finance and investors since the introduction of Efficient Market Hypothesis (EMH) Concept in 1960s by Eugene Fama. Since then, there has been numerous researches on EMH which suggest that when the hypothesis hold a market, the there is a high propensity of earning abnormal returns on investment (Fama, 1970, Griffin, 1977, Ball 1978 and Mackinlay, 1997).

Earning announcement information plays a very important role in the functioning of stock markets both at individual and institutional investor levels. Stock market reaction to earnings announcement has received significant attention in Finance and Accounting literature. Mohamed (2010), and Eleke-Aboagye and Opoku (2013) are some of the studies that observe a revision of stock prices associated with the release of earnings announcements especially in developing markets in Africa.

When firms release their earnings, analysts review them to their predetermined estimates for the financial period concerned. The estimates are based on the firm's past performance, recent good or bad news and any outside effects (that is, economic conditions), that may affect the firm's performance. Earnings reports which are higher or lower than analysts comprise earnings surprises.

Surprise earning announcements can significantly affect stock prices. Positive surprise earnings announcements typically drive up the firm's stock price by sending a positive signal to investors about the firm's future cash flows. Conversely, a negative earnings surprise announcement exerts a downward pressure on stock prices

as investors perceive a negative signal about the firm's future. For over 40 years, researchers have consistently documented the phenomena in stock markets where stock prices tend to drift in the direction of the earning surprise following earning announcements. This phenomenon is referred to as the Post Earnings Announcement Drift (PEAD). A vast body of research has documented the tendency of stock prices to show a continuous drift after the release of earning announcements. The systematic increase in price returns around earnings announcements can be observed in periods either before or after earning announcements.

How fast the stock market reacts to publicly announced information will depend on how efficient the stock market is. Market efficiency refers to a condition in which current prices reflect all the public available information about a security. The basic idea underlying market efficiency is that competition will drive all information into the price quickly. An efficient market emerges when new information is quickly incorporated into the share prices. In other words, the current market price of a security reflects all available information in an efficient market.

The growth of businesses in Africa will depend on the ability of these businesses to expand and have a greater market share not only in the region but also beyond the continent's boundaries. This means businesses will have to raise additional borrowings to expand. Basically, the size of retained earnings of a business depends largely on what is paid out to shareholders or the dividend policy of the business. Considering the fact that gearing usually has negative implications on the image of a business and retained earnings are difficult to come by, the probable solution is through the stock market (Osei, 2003).

1.2. Problem Statement

An efficient market should portray equality in pricing of shares. With available information, the market makes expectations of the prospects of the share and therefore gives an accurate intrinsic value of the security. Should the price differ from the expected value, buying and selling will take place and this will subsequently cause the market price to rise or fall until the value placed on the share by the market is reached. This means that under efficient markets, share price is a good estimate of the value placed on the security by the market at any point in time and hence abnormal volatility resulting to abnormal gains cannot be witnessed.

Unfortunately, this is not the case in emerging capital frontier markets, such as the Ghana Stock Market. According to a study done by Eleke-Aboagye and Opoku (2013), a sizeable number of Ghanaian investors do not know much about the operation and mechanisms of the capital markets. Therefore, the ability of the frontier market to impound financial information and incorporate it into prices to match the risk is in doubt. The lack of understanding and the poor state of communication to facilitate information flow has been blamed. They are required to do, considerable price volatility and increases in trading volume are evident. According to Osei (2002), the inefficiencies in the Ghanaian markets today raise an issue on whether investors should cash in on the inefficiencies or encourage professionalism and thorough market research that will move investors from trends to a solid and more grounded investment that is inclined to long term positive gains. Therefore, there is need to establish the effect of earnings announcements on share price changes for companies listed at the Ghana Stock Exchange (GSE).

Nevertheless, the Ghana Stock Market has experienced some improvement in their market efficiency and investors has been gradually responding to earning announcement information. The trend of GSE Stock Index and Returns from January 1990 to December 2016 in figure 1 and figure 2. This trend give rise to the need to investigate earning announcements and the response of investors based on the state of the economy.

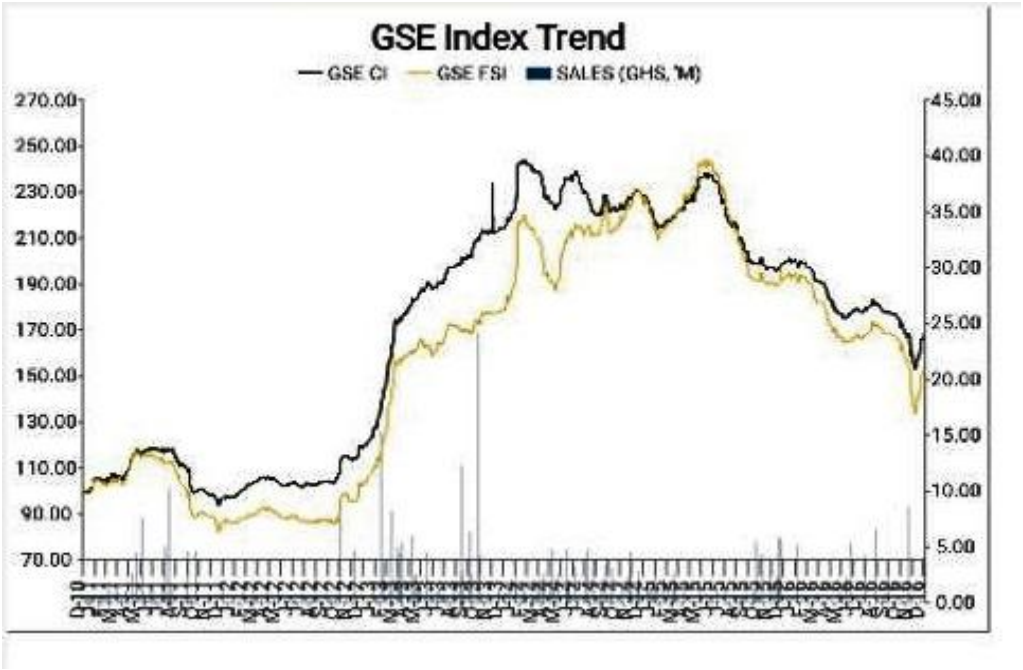

Figure 1. Ghana Stock Market shares index trend from January 1990 to December 2016 (Hunkar, 2012).

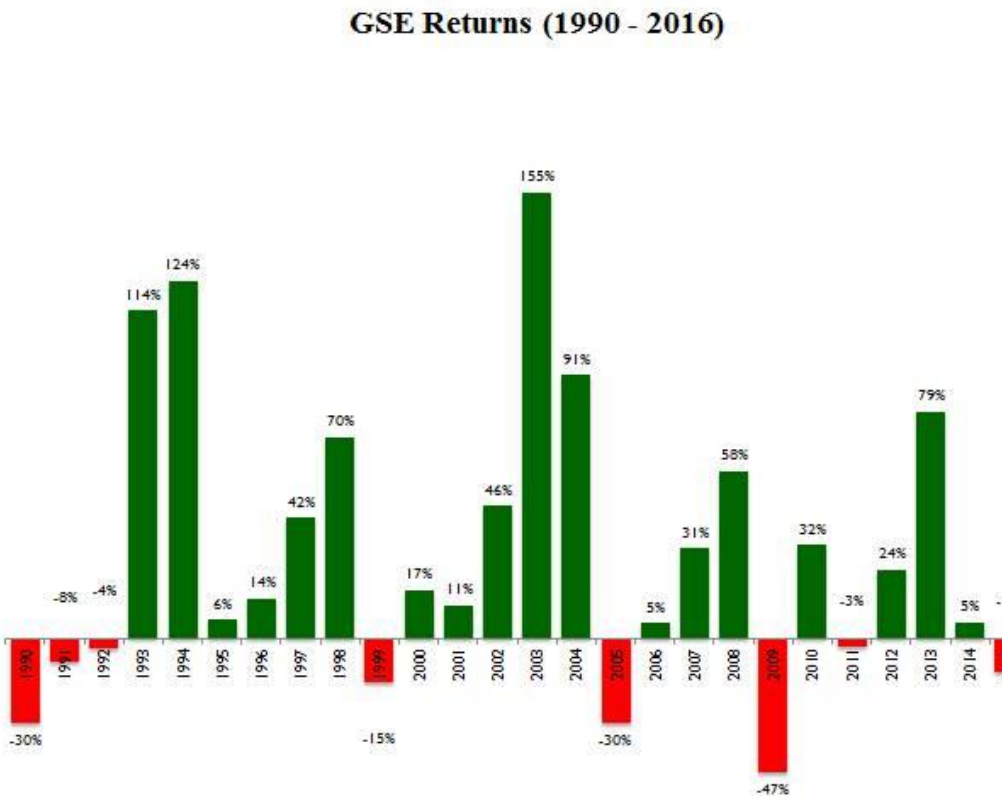

Figure 2. Ghana Stock Market Shares Returns from January 1990 to December 2016 (Hunkar, 2012).

The GSE Share Index has seen tremendous upward rise and little downward turns as the performance of the economy declined which suggest the market is gradually becoming efficient and responses to market events. For instance, Ghana stock market reacted negatively to global financial crisis which shares returns declining about 47% in 2009 and seeing positive Return of about 30% during the announcement of global financial recovery in 2010.

1.3. Objectives

Generally, the study sought to investigate the influence of earnings announcements on share price changes for companies listed at the Ghana Stock Exchange (GSE). Specifically, the study sought to:

1. Investigate the reaction of share prices to earnings announcements of companies listed on the Ghana stock exchange (Test the efficient market hypothesis on Ghana Stock Exchange).
2. Investigate the influence of abnormal returns on investment decisions by Investors
3. Examine the level of volatility on abnormal returns on the stocks.

1.4. Research Questions

Base on the set-out objectives, the following questions have been comprehensively formulated to achieve these objectives.

1. What is the reaction of share prices to earnings announcements of companies listed on the Ghana Stock Exchange?
2. What is the influence of abnormal returns on investment decisions by Investors of companies listed on the Ghana Stock Exchange?
3. What is the level of volatility on abnormal returns on the stocks?

1.5. Scope and Justification of this study

The study focused on examining the impact of earnings announcements on share price changes of companies on the GSE.

Examining the impact of earnings announcements on share price changes for companies listed on the Ghana Stock Exchange (GSE) using standard market model is novel in terms research in the Ghanaian context. The standard market model assumes a linear relationship between the return of a given security to the return of the market portfolio. In this respect, this study pushes further the frontiers of econometrics in academia by employing the above mention method. Findings from

the study in this respect, will be of great importance to both researchers and investors. Further, the study serves as ground breaking platform for further scholarly studies in the stock market.

1.6. Organization of the Study

The study is organized into five chapters. Chapter One is the introduction which covers the background to the study, problem statement, and justification of the study and organization of the study. Chapter Two presents summary of the existing theoretical and empirical literature on effect of earnings announcement on share prices. Chapter Three provides an overview of research methodology. It includes the data collection technique, the target population, sample size and sampling techniques to be adopted. Chapter Four deals with presentation and discussion of results whilst Chapter Five focused on conclusions of the study and recommendations.

2. THEOLOGICAL BACKGROUND AND LITERATURE REVIEW

This chapter presents a systematic review of relevant existing literature, key theoretical concepts and models used in examining the impact of earnings announcement on share prices. The chapter therefore provides a broad discussion and review of relevant capital market theories and empirical evidence by prior researchers.

2.1. Theoretical Framework

This section provides discussion on relevant theories which forms the theoretical bases of this study. The theories discussed include Arbitrage Pricing Theory, Efficient Market Theory, and Rationality Theory.

2.2. Arbitrage Pricing Theory

Market portfolio plays a pivotal role in the capital asset pricing model CAPM. The fact that this portfolio is not observable in practice makes it difficult to test the theory. It also makes applications of the model for estimation problematic because we can never know how well proxies for the market portfolio capture the true underlying relationship between risk and return. Despite these misgivings the CAPM has great appeal because, stripped of its formal assumptions, it rests on the intuition that total risk can be separated into diversifiable and non-diversifiable components, that expected returns are related only to the latter uncertainties and that the relationship is a simple linear one.

In an attempt to circumvent the reliance of the CAPM on the properties of the unobservable market portfolio Ross (1976), expanded on this idea by developing the so-called Arbitrage Pricing Theory (APT). The theory holds that the expected return

of a financial asset can be modelled as a linear function of various macro-economic factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient. The model-derived rate of return will then be used to price the asset correctly. The asset price should equal the expected end of period price discounted at the rate implied by the model. If the price diverges, arbitrage should bring it back into line. It describes the price where a mispriced asset is expected to be.

The APT is a substitute for the Capital Asset Pricing Model (CAPM) in that both assert a linear relation between assets' expected returns and their covariance with other random variables. (In the CAPM, the covariance is with the market portfolio's return.) The covariance is interpreted as a measure of risk that investors cannot avoid by diversification (Daniel, Hirshleifer and Subrahmanyam, 2001). Also the slope coefficient in the linear relation between the expected returns and the covariance is interpreted as a risk premium (Daniel, Hirshleifer et al, 2001).

2.2.1. Efficient Market Theory

The concept of the Efficient Market theory (EMT) states that prices of financial assets reflect all relevant information (Malkiel, 2003). Therefore, prices in average are accurate, that means financial markets are efficient. A direct consequence is that an active investor cannot continuously beat the market and a passive investor can achieve the same profit in average as the active does. Overall, market values are always true and future prices are random depending on randomly incoming news (information).

The EMT theory was developed by Fama in the early 1960. He and other authors corroborated a largely ignored thesis from a French mathematician Louice Bachelier.

Moreover, Fama extended and refined the theory with a definition of three forms of market efficiency (Fama, 1970) — the weak form, the semi-strong form and the strong form.

2.2.1.1 Weak form

Fama (1970), summarized the early efficient market literature using his own contributions and other studies of the information contained in the historical sequence of prices, and concluded that the results were strongly in support of the weak form of market efficiency. He then reviewed a number of semi strong and strong form tests, and concluded that, "in short, the evidence in support of the efficient markets model is extensive, and contradictory evidence is sparse" (Fama, 1970 p 43). He however conceded that much remained to be done and he indeed returned to the field in 1991 with a re-interpretation of the efficient market hypothesis in the light of subsequent research.

Another study in 1994, 'Weak Form Efficiency and Mean Reversion in the Malaysian Stock Market' was conducted by Lian and Lieng, addressing the issue of weak form market efficiency in the Malaysian case by examining the random walk behaviour of stock prices over the short run in the Kuala Lumpur Stock Exchange (KLSE). This study used the closing levels of the seven KLSE stock indices; Composite Index, Emas Index, and the five Sectoral Indices. The tests employed were run tests, serial correlation test, Ljung-Box-Pierce Q test, and the Von Neumann's ratio test, which are based on returns of short horizons. Lian and Lieng used the daily, weekly, and monthly levels of the seven KLSE stock indices over a period of 9 years (1984-1992).

Meanwhile, results were given for the two equal sub-periods of 1984-June 1988, and July 1988-1992 in order to make comparisons. Study on the long-run random walk behavior in the KLSE was also given attention by Lian and Lieng (1994) as the phenomena of short-run random walk behaviour might not hold in the long-run. This was because they could revert to some mean level over longer horizons and they would thereby be said to be mean reverting. The study was done by investigating whether indices exhibited mean reversion. In the run test to confirm the efficiency which compared the actual number of runs with the expected to determine the dependence in price changes, no conclusion was made by Lian and Lieng (1994) since the results were in contrast among the daily, weekly, and monthly data. The results of the various statistical tests on the KLSE daily stock indices indicated serial dependence and successive price changes. All the tests showed that the Malaysian Stock Market had improved its efficiency from a weak form inefficient market in the mid 1980's to a weak form efficient market by the late 1980's and early 1990's.

2.2.1.2 Semi-Strong Form

Studies of the semi strong form of the efficient market hypothesis can be categorized as test of the speed of adjustment of prices to new information. The principal research tool in this area is the event study. An event study averages the cumulative performance of stocks over time, from a specified number of time periods before an event to a specified number of periods after. Performance for each stock is measured after adjusting for market-wide movements in security prices. The first event study was undertaken by Fama, Fisher, Jensen and Roll (1969), though the first to be published was by Ball and Brown (1968). Using the market model or Capital Asset Pricing Model (CAPM) as a benchmark, these event studies provide evidence on the

reaction of share price to stock splits or earning announcements. In both cases, the market appears to anticipate the information, and most of the price adjustment is complete before the event is revealed to the market. When news is released, the remaining price adjustment takes place rapidly and accurately. Fama et al. (1969), study demonstrates that prices reflect not only direct estimates of prospective information by the sample companies, but also information that requires more subtle interpretation.

2.2.1.3 Strong Form

Since the first event studies, numerous papers have demonstrated that early identification of new information can provide substantial profits. Insiders who trade based on privileged information can therefore make excess returns, violating the strong form of the efficient market hypothesis.

The first such study was Treynor's (1965) article in the Harvard Business Review on the performance of mutual funds. The most frequently cited article on fund managers' performance was to be the detailed analysis of 115 mutual funds over the period of 1945-64 undertaken by Jensen (1968). On a risk-adjusted basis, he finds that any advantage that the portfolio manager might have is consumed by fees and expense. Fama (1998) summarizes a number of studies on mutual funds and institutional portfolio managers' performance. Though some mutual funds have achieved minor abnormal gross returns over expenses, pension funds have underperformed passive benchmarks on a risk-adjusted basis.

2.2 Information Content of Earning Announcements

According to Ball and Brown (1968), prices anticipate earnings surprises. Thus, some information signals, possibly including informed trades, are realized before

earnings announcements and convey information to the market regarding the announcement. Trades by corporate insiders are an example of informed trade that anticipates future disclosures. For example, Agrawal, Jaffe and Mandelker (1992), reports that almost half of the price run-up before takeovers occurs on days when insiders trade on knowledge of the takeover, suggesting that the stock market detects informed trading and impounds large proportion of the information into the stock price before it becomes public. Past event studies done tried to answer whether an event (that is, earning announcement) convey new information to make market participants as reflected in changes in the level or variability of security prices or trading volume over a short period of time surrounding the event. Aharony and Swary (1980) and Altiok-Yilmaz and Selcuk (2010) also suggested that earnings announcements carry important information investors depend on in making investment decision and react quickly to both negative and surprises in an efficient market

Related studies done on the other hand test for positive correlation between accounting performance measures (for example earning or cash flows from operations) and stock returns, both measured over relatively long time periods, for instance one year. However, these studies do not assume that financial reports are the only source of information and no causal connection is inferred. The studies proved that earnings surprises correlated with stock returns. Bernard and Thomas (1989, 1990) proved in their studies that market response to earnings is asymmetric (that is, good news gets incorporated into price faster than bad news).

Bodie, Kane and Marcus (2009) argued that volatility varies each period in responses to new information on return and the new information influences investors to review

their assessment to intrinsic. therefore, the variances of the rates on return on stocks are time varying. Beaver (1968) suggested that return volatility and trading volume which is evidence of information flow to the market increases during earnings announcements.

2.3 Earnings-Returns Responsiveness

Earnings Response Coefficient (ERC) is the coefficient from a regression of returns on earnings. It represents a mapping of earnings' time-series properties and discount rates into changes in equity values. Also, it represents the present values of the revisions of expected future earnings (Jorgensen, Li and Sadka, 2012). Prior literature has identified four determinants of ERC; persistence, growth, beta, and interest rates; which relate ERC to economic determinants such as competition, technology, innovation, effectiveness of corporate governance compensation, and so on. Kormendi and Lipe (1987) showed that earnings surprises cause investors and analysts to revise their expectations about future earning levels. Other studies determined that the sign and magnitude of stock prices responses are correlated positively with the sign and magnitude of unexpected earnings (Wu and Xie, 2003; Gasteen and Houston, 2007).

Further, Sadka and Sadka (2009) studied the effects of predictability on the earnings-returns relation for individual firms and for the aggregate. They demonstrate that prices better anticipate earnings growth at the aggregate level than at the firm level, which implies that random-walk models are inappropriate for gauging aggregate earnings expectations. Moreover, they show that the contemporaneous correlation of earnings growth and stock returns decreases with the ability to predict future

earnings. Their findings may therefore help explain the apparently conflicting recent evidence that the earnings-returns relation is negative at the aggregate level but positive at the firm level. Kousenidis (2005), examined the association between stock returns and accounting earnings for a sample of Greek firms listed on the Athens Stock Exchange (ASE) over the period from 01/1992 to 12/1999. They demonstrated that the explanatory power of earnings for contemporaneous stock returns is very poor.

2.4 Earnings Quality and Other Signals

Earnings quality is an important aspect of evaluating an entity's financial health. According to Dechow, Ge and Schrand (2010), earning quality refers to the ability of reported earnings to reflect the company's true earnings, as well as the usefulness of reported earnings in predicting future earnings. It also refers to the stability, persistence, and lack of variability in reported earnings. The evaluation of earnings is often difficult because companies highlight a variety of earnings figures: revenues, operating earnings, net income, and proforma earnings. In addition, companies often calculate these figures differently. Pratt and Salimi (2010) defines earnings quality as the extent to which net income reported on the income statement differs from true earnings. Hodge (2003) suggested that an investor's perception of Earnings Quality depends on auditor independence, and the usefulness of audited financial information. According to Penman (2003), the quality of earnings is based on the quality of forward or future earnings as well as current reported earnings.

2.5 Earnings Announcements

The amount of profit that a company produces during a specific period, which is usually defined as a quarter (three calendar months) or a year. Earnings typically

refer to after-tax net income (Atiase, Li, Supattarakul and Tse, 2005). Ultimately, a business's earnings are the main determinant of its share price, because earnings and the circumstances relating to them can indicate whether the business will be profitable and successful at the long run (Kaniel, Liu, Saar and Titman, 2012).

Companies operate with the aim of making profit and hence increasing the shareholders wealth. At the end of every financial year, financial reports that communicate the firms' performance are prepared and made available to all stockholders and stakeholders.

Dey and Radhakrishna (2008) studied the performance of Abnormal returns around the announcement date, and their findings suggested that investors who rely on earning announcement earn weaker positive or negative Abnormal returns a day before (day -1) and after (day 1) the announcement day 0. Francis, Schipper and Vincent (2002), investigated whether competing information, primarily analyst reports, reduces the usefulness of earnings announcements. Contrary to the view that information in analyst reports substitutes for earnings announcements, they find a positive relation between absolute abnormal returns to the two types of disclosures. This positive relation also characterizes subsequent period analyst reports relative to current period earnings announcements. Further, they find that aggregate absolute reactions to both types of disclosures increased over 1986-1995. These results provide little support for the view that the informativeness of earnings announcements is eroded by competing information in the form of analyst reports.

2.6 Previous Research on Event Studies

Research on Event studies started over 80years ago with Dolley (1933) who first published his work on the effect of stock split on price using about 95 stock splits for the studies. After the publication, interest in Event studies increased. MacKinlay (1997), Myers and Bakay (1948), Barker (1956, 1957) and Ashley (1962) researches on Event studies around that period.

Ball and Brown (1968) and Fama, Fisher, Jensen and Roll (1969) designed a methodology for conducting Event studies in Economics and Finance. Ball and Brown (1968) studied the effect of information content on earnings while Fama et.al (1969) researched on the impact of stocks split. Their methodology is what is used today by researchers conducting event studies even though, there have been some modifications by Brown and Warner in 1980 and 1985 that made adjustment to accommodate specific hypothesis in their studies (Mackinlay, 1997).

Though, there have been numerous studies on event studies on earnings, majority of them were performed on developed markets like the United States stock markets (i.e. NYSE, NASDAQ, etc), LSE in London, Euronext within the European Union and others. These markets are well developed and efficient. These markets are well developed and large and studies on these markets might differ from less developed markets. Limited studies on event studies are made on less developed markets in Africa like the Ghana stock market. Among these researches include Eleke-Aboagye and Opoku (2013) study on the "Effect of Earnings Announcement on Share Prices in Ghana", Osei (2003) study on the "Response of earnings information announcements by listed companies on the Ghana Stock Exchange and Sare, Akuoko and Esumanba (2013) study on "Effects of Earnings Announcement on Share Price: the case of Ghana Stock Exchange.

The information efficiency of the developed market as indicated by many studies might not be the same as the small and less develop market like Ghana Stock Exchange. In order to attest the universality of Efficient Market Hypothesis more studies must be performed on less developed markets like Ghana therefore necessitating the need of this paper.

3 RESEARCH METHODOLOGY AND DATA

In this chapter, the method followed in undertaking the study is outlined. Specifically, a detailed description of the research design, population, sample and sampling procedure, model specification, research instruments used as well as data collection procedure and analyses.

3.2 The Market Model

Mackinlay (1997) describes different models that can be used for an event studies but for the purpose of this study the Market model. This model causes less problems and has high explanatory power when relating to individual stock returns. The market model assumes a linear relation between the market and stock returns. The model is expressed as:

$$\boldsymbol{R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}} \ \#(\mathbf{1})$$

$$\boldsymbol{E(\varepsilon_{it} = 0)} \qquad \boldsymbol{var(\varepsilon_{it}) = \sigma_{\varepsilon}^2} \ \#(\mathbf{2})$$

Where $\boldsymbol{R_{it}}$ and $\boldsymbol{R_{mt}}$ denote the stock and market portfolios for period *t* respectively, the $\boldsymbol{\beta_i}$, and $\boldsymbol{\alpha_i}$ are the constant parameters obtained from the estimation period and $\boldsymbol{\varepsilon_{it}}$ is the disturbance term. Most event studies use stock market indexes as market proxies for their research as in the case of Mackinlay (1997) using S & P 500, CRSP Value Weighted and CRSP Equal Weighted Indexes were used.

Mackinlay (1997) identified the advantages of using the market model over other models in event studies. The market model removes the part of the returns that result from the variance in the market return. This makes the abnormal return to obtain less variance, making it easier to observe the effects of an event.

3.3 Event Study Methodology

Event study in finance is the measurement of the impact of a specific event (i.e. earning announcement, merger and acquisition, dividends earning, etc) on the value of a firm or a market. Stock prices respond quickly to an event. In the analysis of the information content of an announcement in the market, event study is one of the best tools (Mackinlay, 1997).

The first step in conducting an event study is the determination of desired event at the market. In the case of this paper, the desired event is earning announcement and the market under study is the Ghana Stock Exchange (GSE) with ten (10) selected listed companies. Again, it is crucial to set an estimation under which the event occurred. Thus, specific periods before the event and after the event. (E.g. -10days, 0 day; event day and +10days). The event period allows accurate analysis of the event. (MacKinlay, 1997).

MacKinlay (1997) also indicates the importance of computing the abnormal and cumulative abnormal returns of an event study on earnings. The subsequent subsections of this chapter discuss them. It must be noted that the procedure of this event study follows the methodology described by MacKinlay (1997) which has become the standard procedure for most event studies in recent years.

3.3.1 Event Window Estimation

MacKinlay (1997) suggested it is very important to estimate the event period in conducting event studies. To MacKinlay (1997), the event window should be significantly large number of days than the specified event period of interest to the study so that it will be easier in the evaluation of the periods around the event. He

also indicated the importance of avoiding an overlap between the event window and the estimation window not to affect the estimation of the returns on the effects of the event.

The estimation window of 60 trading days before event window is applied in this study. The event window is +10 days, -10days and the event day 0 is the earning announcement day. The Post Announcement period is the period after the event window. The event can be illustrated graphically within a timeline which is divided into Estimation Window, Event Window and Post Announcement Period.

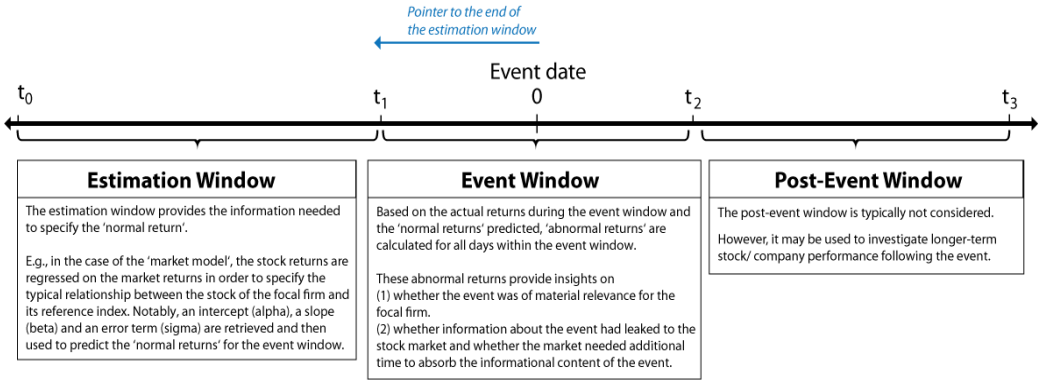

Figure 3. Event Timeline for an Event Study as illustrated Benninga (2008;372).

3.3.2 Abnormal Returns

When normal returns are estimated using the market model as used by Ball and Kothari (1989), the next step is the calculation of the abnormal returns of the firms involved in the study. Abnormal return for an asset is the difference between the actual return and the expected return. MacKinlay (1997) defined abnormal return of an event study as the realized ex-post return of an asset divided by the event window minus the normal return of the firm divided by the event window (p.15). This definition can be simplified mathematically for an abnormal return of an asset "*i*" and event date "*T*" as:

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau}|X_{\tau}) \#(3)$$

$\boldsymbol{X_{\tau}}$ representing the information content of the model for estimating normal returns conditioned upon.

Using the market model, the conditional variance of abnormal returns is defined as:

$$\sigma^2(AR_{i\tau}) = \sigma_{\epsilon}^2 + \frac{1}{L_1}\left[1 + \frac{(R_{m\tau} + \hat{\mu}_m)^2}{\hat{\sigma}_m^2}\right]. \#(4)$$

σ_{ϵ}^2, represents the disturbance Variance

$\boldsymbol{L_1}$ represents the length of the estimation window and as it becomes large, the second term moves towards zero and the conditional variance of abnormal returns can be approximated by the first term which is the squared standard error of regression for each market model (MacKinlay, 1997).

Choosing substantially long estimation window makes estimating the variance of abnormal returns required to test the null hypothesis less problematic.

3.3.3 Cumulative Abnormal Returns

It is difficult to say much for an individual using abnormal returns to observe and make analysis of an event of interest in the long horizon. Therefore, the abnormal returns need to be accumulated across time for each of the individual event firm. This concept is what is termed the Cumulative Abnormal Return (CAR). If the dates T_1 and T_2 represent the last days of the estimation window respectively, CAR is calculated from T_1, to T_2 where $T_1 < \tau_1 \leq \tau_2 \leq T_2$, as indicated in MacKinlay (1997). The CAR for an asset □ across the event window can be defined by the equation:

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau}. \#(5)$$

To infer conclusions about the earnings announcement event effects, it is important to aggregate across the assets. A method of detecting the cumulative abnormal returns associated with an event can be in four (4) steps as proposed by MacKinlay (1997). First, the 3 categorizations of earning announcement event are defined; "Good News" (where realized earnings exceed expected 2.5% or more), "Bad News" (where realized earnings fall below 2.5% of expected), and "No News" (where the announced earnings are within 2.5% of expected). However, with this study, minimal earnings announcement falls within the 2.5% making earnings surprise categorization very difficult and making some event categorization especially "No News" next to nothing event. Therefore, in this study, event categorization is ignored. The elimination of the event categorization conforms to the Brown and Warner (1985) procedure of conducting an event study.

Secondly, after the assets are assigned to the categories, the next step is to calculate the sample abnormal return in each category for each of the 21days in the event period. This study calculates the sample abnormal returns on a yearly basis summing them across the whole sample. The sample abnormal return for period τ, $\tau = T_1 + 1, \ldots, T_2$, is defined as:

$$\overline{AR_\tau} = \frac{1}{N}\sum_{i=1}^{N} AR_{i\tau} \,.\#(6)$$

Whereas the sample variance of the abnormal return is calculated as defined below:

$$Var(\overline{AR}) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_{\varepsilon i}^2 \,.\#(7)$$

σ_{ε}^{2} is the squared standard error of the market model regression for each firm.

The formula for each firm. The formula for the variance requires that the number of the days in the estimation period be large.

The next step is to sum up the sample abnormal returns for the yearly announcement period into one sample return for each event day across the yearly sample. The next step is the calculation of the cumulative abnormal return as defined below:

$$\overline{CAR}(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \overline{AR_{\tau}} . \#(8)$$

The conditional variance of the cumulative abnormal returns is defined as:

$$var\left(\overline{CAR}(\tau_{1,}\tau_2)\right) = \sum_{\tau=\tau_1}^{\tau_2} var(\overline{AR_{\tau}}). \ \#(9)$$

The null hypothesis that the event has no effect on returns can be tested after the abnormal returns are defined. The statistical properties of the cumulative abnormal returns are then assumed to be Expected value Zero, Variance as defined above. Testing the null hypothesis H_0 can be done by calculating the value of θ_1:

$$\theta_1 = \frac{\overline{CAR}(\tau_{1,}\tau_2)}{var\left(\overline{CAR}(\tau_1, \tau_2)\right)^{1/2}} - N(0,1). \#(10)$$

3.4 Description of Data

The quantitative empirical research design was fused with the standard event study methodology, this methodology assumes that it is possible to isolate the part of a stock's return which concerns this specific event. The event in this study was the earnings announcement surrounding shares of companies listed on the Ghana Stock

Exchange (GSE). The GSE was selected because it is the only Capital market in Ghana and among the best in Africa.

The population of the study is made up of all forty-three (43) listed companies on the GSE. The purposive sampling technique was employed in selecting ten (10) companies from the forty-three (43) listed firms on the GSE. The data collection process specifically involved sampling the daily closing stock prices of publicly listed companies that made annual announcements from 2014 to 2017, 60 days before and after announcement. The study removed companies whose announcement dates were difficult to be obtained within the period. The sample for the entire study was arrived by determining all the companies that made annual earnings announcement during the period under study and has been listed and actively trading throughout the study period.

Table 1. Details of Selected listed companies of Ghana Stock Exchange.

No.	Name of Company	Market Symbol	Industry	Date of Issue
1	Ghana Oil Company Ltd	GOIL	Petroleum	16-Nov-2007
2	Tullow Oil Plc	TLW	Oil and Gas Exploration	27-July-2011
3	AngloGold Ashanti Ltd	AGA	Mining	27-Apr-2004
4	Aluworks Ltd	ALW	Metal	29-Nov-1996
5	Ayton Drugs Company Ltd	AYRTN	Pharmaceutical	14-Aug-2006
6	Cal Bank Ltd	CAL	Financial	5-Nov-2004
7	Benso Oil Palm Plantation Ltd	BOPP	Agriculture	16-Apr-2004
8	Clydestone Ghana Ltd	CLYD	ICT	19-May-2004
9	Camelot Ghana Ltd	CMLT	Printing	17-Sep-1999
9	Cocoa Processing Company	CPC	Food Processing	14-Feb-2003
10	Fan Milk Ltd	FML	Food Processing	18-Oct-1991

Source: Ghana Stock Exchange

Similar to Eleke-Aboagye and Opoku (2013), the Composite Index of GSE was used as a proxy in estimating the market model. The secondary data was extracted from the audited annual reports and financial statements of individual companies sourced from the GSE.

4 EMPIRICAL RESULTS

This chapter discusses the findings of the study. The result of the event is presented and an evaluation of the reaction of share prices to earnings announcements of companies listed on the GSE, also the influence of average abnormal returns and cumulative average return on earnings announcement was examined. Again, the volatility level of AAR and CAAR around the event window was evaluated to estimate the level of risk involved in earning AR or CAR on the Ghana Stock Exchange around the event window. Finally, the hypothesis of research was tested to know the market efficiency level of Ghana Stock Exchange to earning announcement.

4.2 Full Sample Results

Table 2 presents 2014–2017 the average abnormal return and cumulative abnormal return with their corresponding volatilities around the 21day event window and a t-statistics of the average returns to measure the degree of responsiveness of the market to earning announcement information. The full sample results consist of 40 annual earnings announcements and 840 stocks under observation. Figure 4 and figure 5 show the graphical presentation of AAR and CAAR within the 21day event window respectively.

Table 2. AAR and CAAR within the Event Window.

	Market Model (%) N (840)		
Day	**AAR (Std dev)**	**CAAR (Std dev)**	**T - Statistics**
-10	0,319	0,319	0,160
	(0,662)	(0,662)	
-9	0,280	0,598	0,260
	(0,814)	(0,729)	

-8	-0,414	0,184	-0,035
	(0,919)	(0,608)	
-7	0,054	0,238	-0,027
	(0,396)	(0,957)	
-6	-0,123	0,115	-0,001
	(1,478)	(2,062)	
-5	0,671	0,786	0,505
	(0,504)	(2,315)	
-4	0,066	0,852	0,133
	(0,372)	(2,569)	
-3	0,740	1,592	0,358
	(0,814)	(1,978)	
-2	0,185	1,778	0,178
	(0,498)	(1,846)	
-1	0,015	1,793	0,145
	(0,601)	(2,073)	
0	-0,999	0,794	-0,168
	(1,317)	(2,786)	
1	-0,496	0,298	-0,084
	(0,772)	(3,224)	
2	-0,569	-0,271	-0,373
	(1,069)	(4,274)	
3	0,048	-0,223	0,170
	(0,341)	(4,574)	
4	0,252	0,029	0,203
	(0,531)	(4,372)	
5	0,353	0,382	0,242
	(0,722)	(4,464)	
6	-0,015	0,367	-0,013
	(0,925)	(4,372)	
7	0,131	0,498	0,438
	(0,823)	(3,767)	
8	-1,290	-0,792	-0,226
	(2,383)	(4,139)	
9	0,424	-0,368	0,300
	(0,570)	(4,685)	
10	-0,180	-0,548	-0,241
	(0,484)	(4,358)	

The table reports the event study of GSE for Market -Model abnormal and cumulative abnormal returns analysis for 10days before and after the event announcement in percentages. The mean is the average return of stocks and the (Std dev) is the standard deviation measuring the volatility of

the returns. The t-stats is for the t-test statistics with H0: Mean =0. The t-stats level of significance is 5%. The n values are the total number of stocks under observation.

4.2.1 AAR Behaviour around the Event window

It is observed from the table 2 that most of AAR around the event window (before and after the event date) were positive except days -8, -6, 6, 8, 10 and the event day 0 with AARs -0,414%, 0,123%, -0,015%, -1,290%, -0,180% and -0,999% respectively. Days -8 and 8, -6 and 6 interestingly have negative AARs. Surprisingly, Day -1 has a marginal negative abnormal return of 0,015% but the event Day 0 had a sharp negative abnormal return of -0.999%. Event Day 1 also had a significant negative abnormal return of -0,496%. The phenomenon of Day -1 and Day 1 around the announcement Day 0 assert to Dey and Radhakrishna (2008) findings which suggested that investors who rely on earning announcement earn weaker positive or negative Abnormal returns a day before (day -1) and after (day 1) the announcement day 0.

The AARs before and after the announcement vary significantly. The highest AAR before the announcement date is 0.740% on Day -3 which is the highest around the 21-day event window and the lowest before the announcement date is -0.414%. The highest AAR after the event is 0.424% on Day 9 and the lowest AAR is -1,290% on Day 8 which is the lowest around the 21-day event window.

It could be observed that there was a significant variation in AARs of Day 7, 8 and 9. Though Day 7 had an AAR of positive percent of 0,131, Day 8 surprising had an AAR of negative percentage of -1,290. The percentage difference in AARs on Day 7 and 8 was -1.159%. Similarly, it was observed that Day 8 and 9 surprising change in

the AAR trend from a significant negative AAR to a significant positive AAR. Day 8 had a negative AAR of -1.290% but Day 9 had a surprising significant positive AAR of 0,424%. The percentage AAR difference of Day 8 and 9 was -0.866%. This surprising trend on Day 7, 8 and 9 could as a result of other factors other than the Market but was not considered in the research.

The statistically significant abnormal return of -0,999% was observed on the announcement day with a statistical testing of -0.168 at 95% confidence level. The significant negative Abnormal Return on the earning announcement day suggest a negative earnings surprise. Therefore, the significant abnormal return on the earnings announcement day suggests that earnings announcements have effects on returns of Ghana Stock Exchange consistent with Sare et al. (2013) findings indicating the efficiency of Ghana Capital market but contrary to the findings of Osei (2002) which suggested that the Ghanaian capital market is less efficient market and earnings announcements do not have direct effect on the stock returns.

Most of the t-statistics of the AARs within the event window of the statistical testing are significant. The AAR of the announcement Day 0 is significantly negative, and the market reacted negatively with a negative t-statistics of -0.168 which statistically significant. Event Day -8, -6. -1, 1, 2, 6, 8 and 10 AARs are negative and their corresponding t-statistics negative and the remaining event days that had positive AARs also had a corresponding positive t-statistics. This pattern conforms to Aharony and Swary (1980) and Altiok-Yilmaz and Selcuk (2010) findings that suggest earnings announcements carry vital information investors depend on in making investment decision and react quickly to both negative and surprises in an

efficient market but contradicts Bernard and Thomas (1990) studies suggesting that market response to earnings is asymmetric.

More so, according to the weak form of the Efficient Market Hypothesis, stock prices reflects its historical prices and future price is independent of the past (Fama, 1977). A critical observation of table 2 shows that most of AARs are statistically significant around the announcement day which is consistent with weak form of Efficient Market Hypothesis.

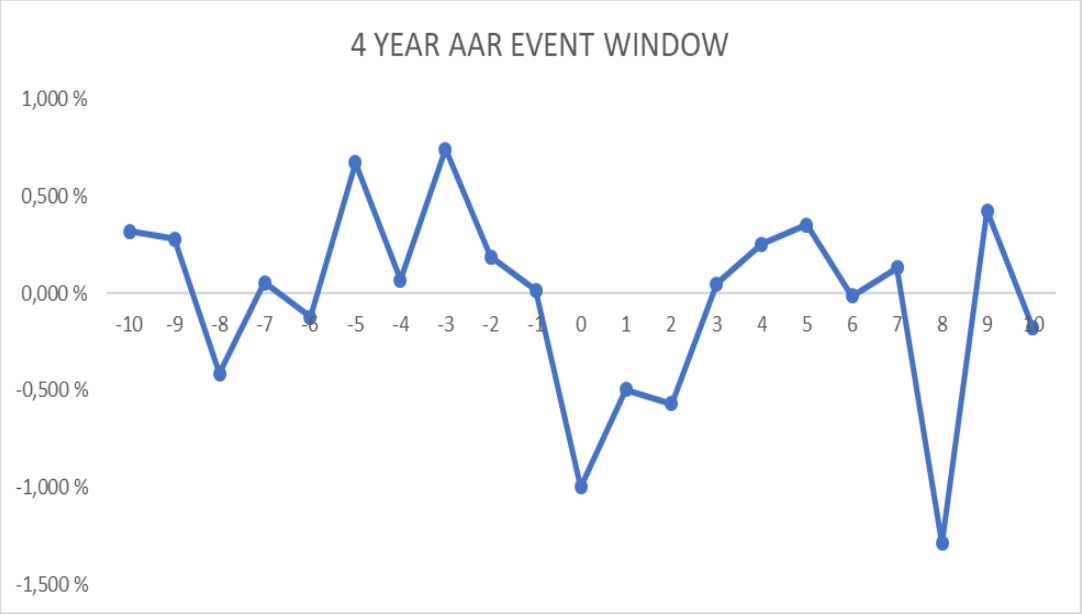

Figure 4. Graphical illustration of AAR within the 21-Day Event window.

Figure 4 graphical presentation of AAR shows wave-like trend. The wave-like trend of the graph suggests the responsiveness of investors to earnings surprises. Day -6, -3 and 9 were peaks with the highest AARs but began to fall significantly through to the announcement day 0. Interestingly, announcement day 0 recorded a significant fall in AAR. A significant rise in AAR was observed after the announcement day 0 but after Day 5, there was a fall in the AAR till it reached its lowest fall on Day 8. The lowest

falls of AAR were Announcement Day 0 and Day 8. The highest peak pattern occurred at the middle before the announcement day (between -5 and -3) and the middle after the announcement day (3 and 6). The lowest fall patterns occurred at the extreme ends of the event window (between day -9 and -6, 7 and 10). and closely around the announcement day (between Day -2 and 3).

4.2.2 CAAR Behaviour around the Event window

Analysing the behaviour of Abnormal Returns from the results does not reveal much about the pattern of the event. Therefore, aggregating the abnormal returns for each event across time within the 21-day event window to better clarify the trend of abnormal return around the earnings announcement date.

From table 2, it is observed that the final CAAR of the event window was -0.548% which the investor who invested within the 21-day event window lost an aggregate of -0.548% Abnormal Return. The CAAR of the pre-event from Day -10 to Day -1 is 0,319% and 1,793% respectively, whereas the post-event CAAR from Day 1 to Day 10 are 0,298% and -0,548% respectively. The CAAR of the announcement Day 0 is 0,794% which is statistically significant and depicting that Ghana Stock Exchange has an efficient market. Interestingly, the highest CAAR within the event window is 1,793% observed on Day -1, a day before the earnings announcement date whereas the lowest CAAR was -0,792% observed on day 8. CAAR from Day -10 continued to be positive till the Day 2 after the announcement day with a CAAR of 0,271%. Post event Day 4 steady positive trend with a CAAR of 0,029% but there is a free fall after post event Day 7 and post event Day 8, 9 and 10 realized a negative CAAR of -0,79, -0,368% and -0,548% respectively.

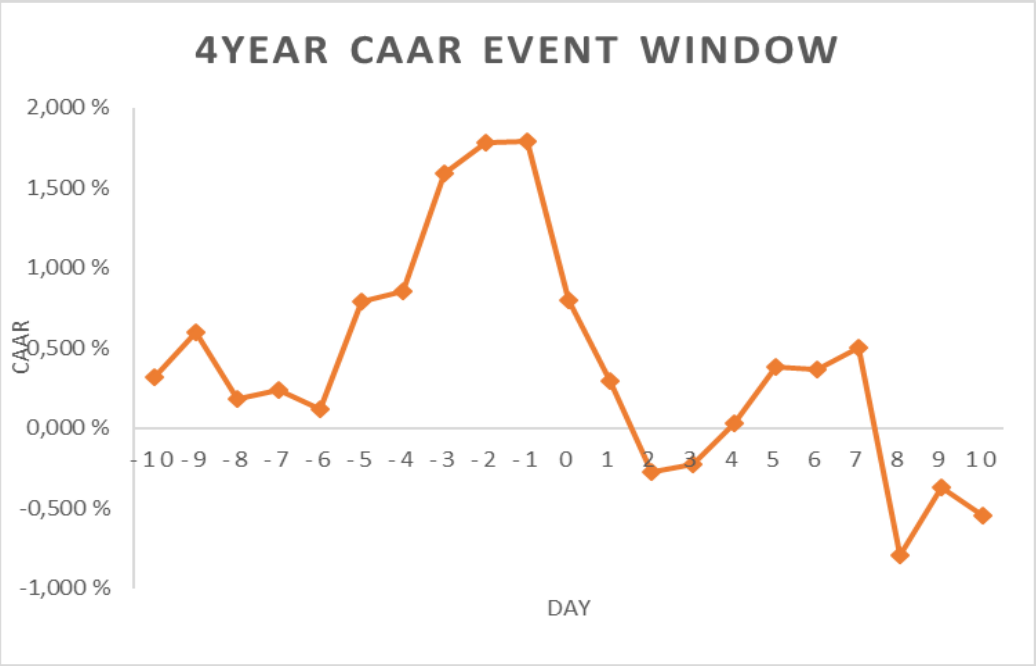

Figure 5.Graphical illustration of CAAR within the 21-Day Event window.

Figure 5 shows steady positive CAAR at start till pre-event day -6. After Day -6, increasing rising positive CAARs were realized and it reached peak on Day -1. This rising trend could be influenced by high AAR before the event date and the market response was quick therefore, CAAR reaching its peak on Day -1. This implies that the investors not anticipating a negative AAR on event day based on historical information of negative AARs before the event day and reacted negative. The announcement day 0 realized falling trend till day 2, depicting investors loss of confidence and uncertainty in the market during and after a negative earnings surprise. CAAR steadily started to rise again from post event Day 3 to Day 7. This could imply the restoration of investors' confidence in the market after the negative earnings surprise. Surprisingly, decreasing trend of CAAR after Day 7 was observed to the end of the post event window. The movement pattern and investors reaction of the CAAR around the event day implies that earnings announcements have effect on stock prices in the Ghanaian capital market.

4.2.3 Volatility Around Event Window

Observation of Table 2 AARs and their corresponding Volatility showed that post-event Day 3 had the lowest volatility level of 0,341% at 0,048% AAR and post-event Day 8 had the highest volatility level of 2,383% at -1,290% AAR. Volatility level on announcement day was higher at 1,317% and AAR of -0.999% and this is consistent with Beaver (1968) suggestion that return volatility and trading volume which is evidence of information flow to the market increases during earnings announcements. Volatility marginally increases 2 days before the announcement day but steadily decreased a day after the announcement Day. Again, a critical observation of the volatility reveals a fluctuating trend of volatility based on AARs within the event window. This indicates that investors risk is dependent on AAR and level of expectation and this result conforms to Bodie et al. (2009) argument that, volatility varies each period in responses to new information on return and the new information influences investors to review their assessment to intrinsic.

CAAR lowest volatility level observed was 0,608% on Day -8 and highest volatility level is 4,685%. On the announcement Day 0 volatility level was 2,786%. Post event day 10 had a volatility level is 4,358% indicating that an investor who invests within the 21day event window risk 4,358% for earning a CAAR of -0,548%.

4.3 Comparative Analysis of Yearly Results

The final sample results in this study was categorized in its year time period to compare the yearly performance of AARs, CAARs, volatility, yearly effects of earnings and the market responses. The 4-year pooled time series 2014, 2015, 2016 and 2017 were analysed separately. The motive of the yearly comparison was to

investigate whether other factors also affect the effects of earning announcements in the different time periods.

Table 3 presents yearly (2014–2017) average abnormal return and cumulative abnormal return with their corresponding volatilities around the 21day event window and a t-statistics of the average returns to measure the degree of responsiveness of the market to earning announcement information. Each yearly sample results consist of 10 annual earnings announcements and 210 stocks under observation. Figure 4.3 and Figure 4.4 show the graphical presentation of the yearly AARs and CAARs within the 21day event window respectively.

Table 3. YEARLY AAR and CAAR around Event Window.

Market Model (%) N (840)												
	2014			2015			2016			2017		
Day	AAR (Std dev)	CAAR (Std dev)	T- Stats	AAR (Std dev)	CAAR (Std dev)	T-Stats	AAR (Std dev)	CAAR (Std dev)	T=Stats	AAR (Std dev)	CAAR (Std dev)	T-Stats
-10	0,329	0,329	0,149	1,251	1,251	0,256	-0,121	-0,121	0,187	-0,184	-0,184	0,047
	(0,893)	(0,893)		(4,585)	(4,585)		(0,455)	(0,455)		(0,550)	(0,550)	
-9	-0,625	-0,296	-0,785	0,001	1,252	0,300	0,429	0,308	0,347	1,313	1,129	1,180
	(1,795)	(2,157)		(0,613)	(4,227)		(0,768)	(0,773)		(4,231)	(4,312)	
-8	-0,034	-0,330	-0,340	-1,561	-0,310	0,157	0,593	0,901	0,417	-0,653	0,476	-0,375
	(0,148)	(2,187)		(5,330)	(1,366)		(1,069)	(1,419)		(2,095)	(2,295)	
-7	-0,465	-0,795	-1,005	0,082	-0,227	0,397	0,498	1,399	0,346	0,099	0,576	0,153
	(1,544)	(2,597)		(0,843)	(1,801)		(1,955)	(2,946)		(0,669)	(2,384)	
-6	-2,099	-2,894	-0,832	1,465	1,237	0,343	0,232	1,630	0,361	-0,089	0,487	0,125
	(5,837)	(6,499)		(4,497)	(3,071)		(0,696)	(3,369)		(0,248)	(2,480)	
-5	0,520	-2,375	0,182	1,023	2,261	1,324	1,115	2,745	0,431	0,025	0,512	0,081
	(1,881)	(6,598)		(2,933)	(3,316)		(2,133)	(5,038)		(0,270)	(2,483)	
-4	-0,385	-2,760	-0,618	-0,091	2,169	0,562	0,347	3,092	0,313	0,395	0,907	0,274
	(1,913)	(6,776)		(0,477)	(3,070)		(1,831)	(5,702)		(1,204)	(2,981)	
-3	1,910	-0,850	0,076	0,462	2,631	0,998	0,562	3,655	0,198	0,027	0,933	0,161
	(5,764)	(9,547)		(1,583)	(3,234)		(2,046)	(7,263)		(0,411)	(3,229)	

-2	0,122	-0,728	-0,100	-0,293	2,338	0,492	0,029	3,683	0,104	0,884	1,817	0,213
	(0,568)	(9,820)		(0,539)	(2,938)		(0,569)	(7,535)		(2,803)	(3,779)	
-1	0,172	-0,556	-0,124	0,040	2,378	0,607	0,646	4,329	0,390	-0,798	1,019	-0,292
	(0,862)	(10,243)		(0,866)	(3,142)		(1,094)	(8,427)		(4,285)	(6,160)	
0	-0,254	-0,810	-0,686	-1,642	0,737	0,380	0,404	4,734	0,473	-2,503	-1,484	-0,838
	(1,607)	(10,861)		(5,275)	(5,641)		(1,326)	(9,121)		(5,511)	(4,566)	
1	-0,056	-0,866	-0,385	-0,075	0,662	0,438	-0,205	4,529	0,228	-1,651	-3,135	-0,619
	(0,468)	(10,862)		(0,501)	(6,032)		(1,026)	(8,501)		(4,774)	(8,040)	
2	-0,908	-1,774	-1,162	-0,150	0,512	0,684	0,643	5,172	-0,326	-1,859	-4,994	-0,688
	(3,636)	(11,992)		(0,486)	(6,371)		(5,505)	(13,414)		(4,971)	(12,554)	
3	-0,273	-2,047	-0,681	0,062	0,574	0,990	0,516	5,688	0,404	-0,114	-5,109	-0,034
	(0,511)	(12,305)		(0,902)	(7,014)		(1,160)	(13,935)		(0,507)	(12,541)	
4	-0,175	-2,223	-0,666	-0,068	0,506	0,855	0,253	5,940	0,235	1,001	-4,108	0,398
	(0,385)	(12,521)		(0,423)	(7,423)		(0,709)	(14,509)		(3,070)	(9,937)	
5	-0,666	-2,889	-1,372	0,878	1,384	1,583	0,345	6,286	0,494	0,854	-3,254	0,263
	(1,295)	(12,867)		(2,879)	(9,058)		(0,808)	(15,037)		(3,545)	(7,035)	
6	-0,466	-3,354	-1,044	-0,969	0,415	0,283	0,204	6,489	0,276	1,172	-2,082	0,431
	(1,090)	(13,437)		(2,848)	(8,465)		(0,780)	(15,668)		(3,839)	(4,933)	
7	0,232	-3,123	-0,034	0,849	1,264	1,588	-1,042	5,447	-0,010	0,487	-1,595	0,208
	(0,989)	(13,629)		(2,948)	(10,024)		(4,229)	(13,261)		(1,933)	(4,734)	
8	0,070	-3,052	-0,251	-4,859	-3,595	-0,374	-0,129	5,318	-0,218	-0,242	-1,837	-0,058
	(0,858)	(13,733)		(12,196)	(10,801)		(1,083)	(12,892)		(0,379)	(4,598)	
9	0,366	-2,686	0,124	-0,095	-3,689	0,824	1,230	6,548	0,083	0,194	-1,643	0,169
	(1,383)	(13,604)		(0,483)	(10,794)		(3,426)	(12,802)		(2,310)	(5,700)	
10	0,440	-2,246	0,139	-0,322	-4,011	0,880	-0,722	5,825	0,188	-0,115	-1,759	-0,009
	(1,622)	(13,557)		(0,455)	(11,099)		(1,677)	(12,554)		(0,463)	(5,838)	

The table reports the event study of GSE for Market -Model abnormal and cumulative abnormal returns analysis for 10days before and after the event announcement for 2014.The mean is the average return of stocks and the (Std dev) is the standard deviation measuring the volatility of the returns. The t-stats is for the t-test statistics with H0: Mean =0. The t-stats level of significance is 5%. The n values are the total number of stocks under observation.

4.3.1 AAR Yearly Behaviour Around the Event Window

Table 3 shows Day -3 within 2014 event had the highest AAR of 1,910%. Day -6 of 2015, Day 9 of 2016 and Day -9 of 2017 had higher AARs of 1,465%, 1,230% and 1,313%. AAR of-4,859% at event Day 8 of 2015 was the lowest. Other lower AARs included Day -6 of 2014, Day 7 of 2016 and Day 2 of 2017 with AARs of -2,099%, -1,042% and -1,859%.

The AARs of the announcement Day 0 for 2014, 2015, 2016 and 2017 were -0,254%, -1,642%, 0,404% and -2,503% at statistical testing of -0,686, 0,380, 0,473 and -0,838 respectively. A day before the yearly event Day 0 had significant positive AARs except 2017 which had a negative AAR of -0,798%. Day 1 after the announcement day also had significant negative AARs. The significant AARs of the announcement Day 0 and the days before and after the announcement Day of the different years under observation showed that the Ghanaian Capital market is efficient and therefore the null hypothesis of the Efficient Market Hypothesis of Ghana Capital market is rejected. More so, the statistically significant t-statistical also indicates that invested depended on earning announcements in making their yearly investment decisions showing that earning announcements has effect on the stock prices of the Ghana Stock Market. Surprisingly, closer observation of the trends of the AARs within the yearly windows showed independence of future AARs making the market a weak efficient market.

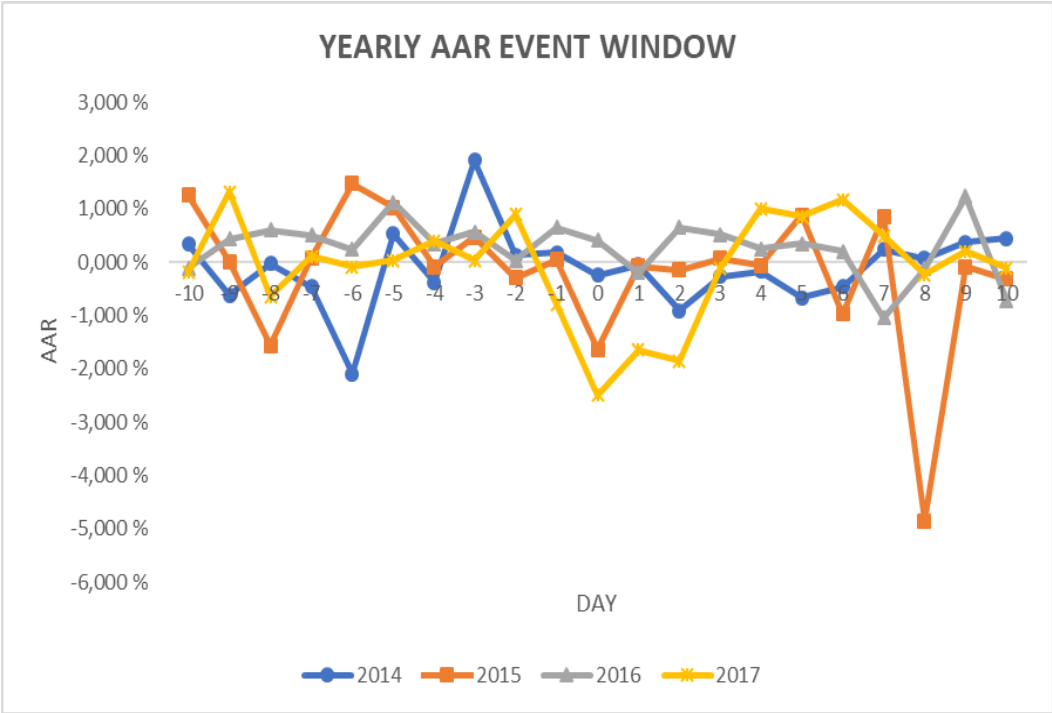

Figure 6. Graphical illustration of Yearly AARs within the 21-Day Event windows.

Figure 6 graphical presentation of the yearly AARs within the event windows shows wave-like trend. The wave-like trend of the graph indicates responsiveness of investors to yearly earnings surprises. 2014, 2015 and 2017 event windows had a swirling wave-like patterns while 2016 event window had a streak wave-like pattern with minor swirls getting to the end of the event window. Day -3 of 2014 had the highest peak and other higher peaks included 2015 Event Day -10 and -6. Surprisingly, all the yearly announcement Day 0 recorded a significant fall in AAR except 2016 that recorded a positive AAR. 2016 had the lowest falls of AAR on Announcement Day 0. 2015 had significant lowest fall that occurred Day 8 at the ends of the event window, other lower fall pattern of 2015 was Day -8 Day 0, and Day 6. Day -6 of 2014, Day 0, Day 1 and Day 2 of 2017 also had a significant lower fall pattern.

4.3.2 CAAR Yearly Behaviour Around the Event Window

Observation shows the final yearly CAARs of the event window for 2014, 2015, 2016 and 2017 were -2,246%, -4,011%, 5,825% and -1,759% respectively which indicates that the investor who invested within the 21-day event window of 2014, 2015 and 2017 had significant losses of aggregate Abnormal Returns of those years but earned a significant aggregate Abnormal Return of 5,825% in 2016. The yearly CAAR of the pre-event between Day -10 to Day -1 were -0,556%, 2,378%, 4,329% and 1,019% for 2014, 2015, 2016 and 2017 respectively, whereas the post-event CAAR between Day 1 and Day 10 were -2,246%, -4,011%, 5,825% and -1,759% for 2014,2015, 2016 and 2017 respectively. The yearly CAAR for 2014, 2015, 2016 and 2017 of the announcement Day 0 were -0,810%, 0,737%, 5,825% and -1,759% respectively and were statistically significant and depicting that Ghana Stock Exchange has an efficient market.

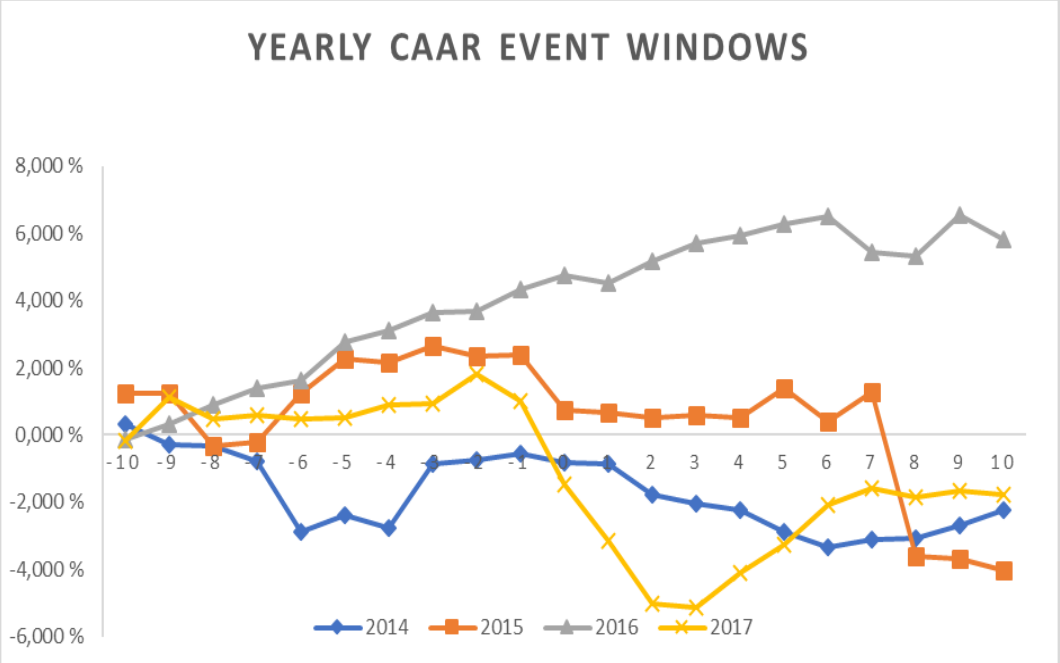

Figure 7. Graphical illustration of Yearly CAARs within the 21-Day Event windows.

Observation of figure 7 indicates that 2016 started drifting upward from pre-event through to the announcement day 0 and continued until it reached its peak on event Day 6. This upward drift could indicate a positive earnings surprise. 2014 showed a downward trend from the start of the window till Day -3 which started to show stability but on the announcement day 0 the CAAR started to drift downward. 2017 CAAR also indicated a CAAR appeared to have a stable trend from the start of the window but started drifting downward from the announcement Day. 2014 and 2017 CAARs downward trend after from announcement Day may indicate a negative earnings surprise. 2015 CAAR showed a swirling pattern from the start of the event but from the announcement Day the CAAR had a steadied trend close to zero till Day 6 that it started swinging downward. The 2015 CAAR may also indicate a no earnings surprise. These CAAR patterns are consistent MacKinlay (1997) argument that earnings announcement that has information content higher than expected earnings should have an effect on increases in value of a stock and lower than expected earnings to have an effect on decrease in value of a stock.

More so, 2016 trend could indicate that Ghana Stock Market was in a bull market similar to Norton (2008) that argued that 2006 to 2008 Ghana Capital Market experienced a bull market. 20014 and 2017 could be experiencing a bear market which is close to Ghana's 2009 economic and currency crises (Sare, et al, 2013).

4.3.3 Yearly Volatility Around Event Window

The lowest Volatility on their corresponding AARs for 2014, 2015, 2016 and 2017 were observed on Day -8 at volatility level of 0,148%, Day 10 at volatility level of 0,455%, Day -10 at volatility level 0,455% and Day -6 at volatility level of 0,248% respectively. Volatility level of 2014, 2015, 2016 and 2017 on announcement day

were higher at 1,607%, 5,275%, 1,326% and 5,511% at significant AARs which is consistent with Beaver (1968) suggestion that return volatility and trading volume which is evidence of information flow to the market increases during earnings announcements. Again, a critical observation of the volatility reveals a fluctuating trend of volatility based on AARs within the event window. This indicates that an investor's risk is dependent on AAR and level of expectation and this result conforms to Bodie et al. (2009) argument that volatility varies each period in responses to new information on return and the new information influences investors to review their assessment to intrinsic.

CAAR volatility level observed on the announcement Day were 10,861%, 5,641%, 9,121% and 4,566% for 2014, 2015, 2016 and 2017 respectively. Day 10 had a volatility level for 2014, 2015, 2016 and 2017 were 13,557%, 11,099%, 12,554% and 5,838% indicating that an investor who invested in 2014 within the 21day event window had the risk of 13,557% for earning a CAAR of -2,246% whilst an investor for 2017 had the lowest risk of 5,838% for earning a CAAR of -1,759%. Again, 2016 investor who had a positive CAAR of 5,825% within the event window bared a risk of 12,554%.

5 CONCLUSION

The main objective of this study was to investigate the effects of earnings announcements on share prices of companies listed at the Ghana Stock Exchange and the efficiency of the market. The study simultaneously examined the level of volatility on abnormal returns on stocks. A sample of 10 listed companies from GSE from which 40 yearly earnings announcements were collected from 2014 to 2017. The event study methodology suggested by Mackinlay (1997) was used to test the data collected. The abnormal returns of this study were defined using a time series market model.

The main findings of the study suggest that Ghana Stock Market is efficient rejecting the null hypothesis of EMH that suggest earning announcements has no effects on stock prices. This finding is contrary to Osei (2002) study that suggested that the Ghanaian capital market is less efficient market and earnings announcements do not have direct effect on the stock returns but consistent with Sare et al. (2013) findings suggesting the efficiency of Ghana stock market. Most of AARs are statistically significant around the announcement day which suggested a weak form of Efficient Market Hypothesis.

The study observed that earnings announcements carry vital information investors depend on in making investment decision and react quickly to both negative and surprises in an efficient market. This finding of the study conforms to the findings of Aharony and Swary (1980) and Altiok-Yilmaz and Selcuk (2010) but inconsistent with Bernard and Thomas (1990) studies suggesting that market response to earnings is asymmetric.

The study also examined the volatility level around the announcement day and it was observed that volatility on earnings announcement day was higher suggesting that return volatility and trading volume which is evidence of information flow to the market increases during earnings announcements; consistent with Beaver (1968) findings. The volatility observation also revealed fluctuation trends within the event window indicating that investor's risk is dependent on AAR and level of expectation and this result conforms to Bodie et al. (2009) argument that volatility varies each period in responses to new information on return and the new information influences investors to review their assessment to intrinsic.

More so, yearly observation of the abnormal returns of the different years showed that the Ghanaian Capital market is efficient. 2016 performance could suggest that Ghana Stock Market was in a bull market similar to Norton (2008) that argued that 2006 to 2008 Ghana Capital Market experienced a bull market. 2014 and 2017 could be experiencing a bear market which is close to Ghana's 2009 economic and currency crises (Sare, et al, 2013). Again, an investor who invested in 2014 within the 21day event window had the highest risk for earning a negative abnormal return whilst an investor for 2017 had the lowest risk of earning a negative abnormal return. An investor who invested in 2016 had a higher risk of earning a positive abnormal return.

5.2 Recommendations for Further Studies

The findings of study could have been different if a wider sample, scope, model and methodology had been used for the same study. It is recommended that more studies on similar topic to ascertain the consistency of this research. The future studies should consider a larger sample size, broader scope to cover more listed copies and

establish more precisely the market reaction for negative, positive and no earnings surprises.

Again, listed companies should be encouraged to ensure timely publication of financial information (i.e. periodic earnings announcements) to reduce unnecessary speculation in the market and help researchers to access larger sample size for broader research.

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APPENDICES

Appendix 1 Goil AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T-STATS
-10	0,705 %	0,705 %	1,351 %	1,351 %	0,783
-9	-0,078 %	0,627 %	0,219 %	1,530 %	-0,036
-8	0,480 %	1,107 %	0,965 %	1,542 %	0,539
-7	0,361 %	1,468 %	0,719 %	1,289 %	0,224
-6	0,055 %	1,523 %	0,265 %	1,393 %	0,035
-5	0,029 %	1,552 %	0,141 %	1,501 %	0,051
-4	1,060 %	2,612 %	0,789 %	1,881 %	1,217
-3	-0,025 %	2,587 %	0,157 %	2,028 %	-0,014
-2	-0,024 %	2,563 %	1,168 %	3,023 %	-0,181
-1	0,715 %	3,278 %	1,250 %	4,246 %	0,826
0	1,572 %	4,849 %	0,733 %	4,916 %	1,753
1	-0,601 %	4,249 %	0,323 %	4,705 %	-0,693
2	0,454 %	4,703 %	1,418 %	6,009 %	0,653
3	0,153 %	4,856 %	0,300 %	6,100 %	0,132
4	0,447 %	5,303 %	0,992 %	6,228 %	0,241
5	-0,371 %	4,933 %	1,792 %	6,328 %	0,158
6	-0,070 %	4,862 %	0,305 %	6,556 %	-0,019
7	0,160 %	5,023 %	0,393 %	6,627 %	0,106
8	-0,535 %	4,487 %	1,057 %	7,144 %	-0,843
9	0,102 %	4,589 %	0,247 %	7,249 %	0,074
10	0,158 %	4,747 %	0,371 %	7,332 %	0,094

Appendix 2 Tullow AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T - STATS
-10	0,052 %	0,052 %	0,192 %	0,192 %	0,229
-9	0,007 %	0,059 %	0,143 %	0,309 %	0,269
-8	0,020 %	0,079 %	0,202 %	0,508 %	0,217
-7	0,024 %	0,103 %	0,257 %	0,765 %	0,232
-6	0,026 %	0,129 %	0,390 %	1,148 %	0,165
-5	-0,007 %	0,122 %	0,390 %	1,531 %	0,207
-4	0,079 %	0,201 %	0,204 %	1,731 %	0,299
-3	0,054 %	0,255 %	0,216 %	1,943 %	0,230
-2	0,091 %	0,346 %	0,258 %	2,182 %	0,129
-1	-2,023 %	-1,676 %	3,929 %	4,677 %	-0,119

0	0,034 %	-1,643 %	0,200 %	4,786 %	0,384
1	-0,082 %	-1,725 %	0,137 %	4,695 %	0,154
2	-2,665 %	-4,390 %	5,547 %	7,801 %	-2,055
3	-0,245 %	-4,636 %	0,697 %	8,405 %	-0,015
4	0,081 %	-4,554 %	0,225 %	8,590 %	0,270
5	0,059 %	-4,496 %	0,213 %	8,783 %	0,249
6	0,032 %	-4,463 %	0,163 %	8,932 %	0,273
7	0,051 %	-4,412 %	0,179 %	9,096 %	0,269
8	0,051 %	-4,361 %	0,154 %	9,229 %	0,261
9	0,056 %	-4,306 %	0,148 %	9,358 %	0,269
10	0,054 %	-4,252 %	0,159 %	9,499 %	0,264

Appendix 3 AngloGold AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T-STATS
-10	0,049 %	0,049 %	0,322 %	0,322 %	0,010
-9	3,841 %	3,890 %	6,363 %	6,315 %	2,679
-8	-0,881 %	3,009 %	3,947 %	3,010 %	-1,132
-7	1,088 %	4,097 %	1,742 %	3,632 %	0,183
-6	0,225 %	4,322 %	0,502 %	3,386 %	0,029
-5	0,758 %	5,079 %	0,848 %	3,525 %	0,115
-4	1,439 %	6,519 %	2,306 %	5,299 %	0,244
-3	6,360 %	12,879 %	8,370 %	7,436 %	1,083
-2	-0,220 %	12,658 %	0,796 %	8,031 %	-0,027
-1	-0,246 %	12,412 %	4,638 %	10,909 %	-1,109
0	0,790 %	13,202 %	1,891 %	12,322 %	0,141
1	-0,338 %	12,864 %	1,448 %	11,291 %	-0,070
2	3,618 %	16,483 %	6,831 %	16,817 %	0,627
3	0,737 %	17,220 %	1,135 %	16,655 %	0,106
4	0,357 %	17,577 %	0,531 %	17,118 %	0,057
5	0,646 %	18,223 %	0,740 %	17,394 %	0,096
6	0,570 %	18,793 %	0,683 %	17,901 %	0,088
7	-2,841 %	15,952 %	6,626 %	12,530 %	-0,514
8	-9,579 %	6,373 %	19,495 %	24,091 %	-1,307
9	0,495 %	6,868 %	0,545 %	24,081 %	0,079
10	-0,123 %	6,745 %	0,462 %	24,511 %	-0,014

Appendix 4 Aluworks AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T-STATS
-10	3,266 %	3,266 %	7,335 %	7,335 %	0,275
-9	0,226 %	3,492 %	1,565 %	6,605 %	0,048
-8	-4,345 %	-0,852 %	8,201 %	2,361 %	-0,504
-7	-1,097 %	-1,949 %	1,197 %	1,949 %	-0,191
-6	-1,228 %	-3,177 %	13,449 %	12,130 %	-0,571
-5	0,477 %	-2,701 %	2,067 %	12,307 %	0,094
-4	-1,132 %	-3,833 %	0,843 %	11,672 %	-0,252
-3	-0,553 %	-4,386 %	0,554 %	11,124 %	-0,131
-2	-0,510 %	-4,896 %	0,571 %	11,085 %	-0,089
-1	-0,768 %	-5,664 %	0,846 %	11,041 %	-0,232
0	-4,593 %	-10,257 %	8,034 %	9,445 %	-0,607
1	-0,715 %	-10,972 %	0,349 %	9,333 %	-0,142
2	-0,979 %	-11,951 %	0,646 %	8,801 %	-0,209
3	-0,747 %	-12,698 %	0,636 %	8,880 %	-0,216
4	-0,680 %	-13,377 %	0,352 %	9,018 %	-0,146
5	-0,676 %	-14,053 %	0,448 %	8,848 %	-0,136
6	-1,081 %	-15,134 %	0,360 %	8,856 %	-0,213
7	-0,714 %	-15,849 %	0,372 %	9,065 %	-0,149
8	-0,318 %	-16,167 %	1,285 %	10,328 %	-0,044
9	2,232 %	-13,935 %	5,806 %	15,498 %	0,403
10	-0,689 %	-14,624 %	0,451 %	15,485 %	-0,114

Appendix 5 Ayrton AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T-STATS
-10	0,027 %	0,027 %	0,054 %	0,054 %	-0,202
-9	-1,442 %	-1,414 %	2,868 %	2,889 %	-1,367
-8	0,023 %	-1,391 %	0,183 %	2,884 %	-0,256
-7	0,022 %	-1,369 %	0,226 %	2,816 %	-0,223
-6	0,009 %	-1,359 %	0,285 %	2,815 %	-0,230
-5	1,461 %	0,102 %	2,852 %	0,506 %	0,891
-4	-1,404 %	-1,302 %	2,955 %	2,750 %	-1,369
-3	0,015 %	-1,287 %	0,420 %	2,688 %	-0,229
-2	-0,008 %	-1,295 %	0,494 %	2,755 %	-0,372
-1	-0,027 %	-1,322 %	0,565 %	2,830 %	-0,357

0	-0,048 %	-1,370 %	0,639 %	2,933 %	-0,337
1	-0,049 %	-1,419 %	0,703 %	3,062 %	-0,279
2	-2,213 %	-3,632 %	3,601 %	3,526 %	-2,419
3	-0,033 %	-3,666 %	3,548 %	3,489 %	-0,259
4	-0,061 %	-3,726 %	3,507 %	3,483 %	-0,312
5	-0,063 %	-3,789 %	3,407 %	3,486 %	-0,267
6	-0,039 %	-3,828 %	3,363 %	3,469 %	-0,272
7	0,017 %	-3,811 %	3,346 %	3,398 %	-0,186
8	-0,017 %	-3,828 %	3,265 %	3,364 %	-0,209
9	-0,008 %	-3,836 %	3,186 %	3,324 %	-0,189
10	-0,011 %	-3,846 %	3,115 %	3,290 %	-0,262

Appendix 6 CAL AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T - STATS
-10	-0,616 %	-0,616 %	1,018 %	1,018 %	-0,047
-9	0,221 %	-0,395 %	0,292 %	0,830 %	0,022
-8	-0,141 %	-0,536 %	0,239 %	0,894 %	-0,106
-7	0,134 %	-0,403 %	1,340 %	1,288 %	0,365
-6	-0,642 %	-1,045 %	0,944 %	1,256 %	-0,818
-5	0,003 %	-1,043 %	0,283 %	1,277 %	0,027
-4	-0,020 %	-1,063 %	0,226 %	1,408 %	0,025
-3	0,820 %	-0,243 %	2,675 %	4,048 %	0,812
-2	2,171 %	1,927 %	4,454 %	5,470 %	1,044
-1	0,440 %	2,367 %	0,620 %	5,326 %	0,040
0	-4,991 %	-2,624 %	7,398 %	6,226 %	-3,502
1	-3,473 %	-6,097 %	7,872 %	12,378 %	-1,862
2	-4,074 %	-10,171 %	7,925 %	19,871 %	-1,912
3	-0,081 %	-10,252 %	0,738 %	19,800 %	-0,427
4	2,085 %	-8,166 %	4,982 %	15,350 %	0,746
5	3,931 %	-4,235 %	6,761 %	14,783 %	2,187
6	-0,025 %	-4,260 %	8,875 %	9,302 %	-2,208
7	3,543 %	-0,717 %	4,703 %	12,619 %	2,967
8	-1,510 %	-2,227 %	4,561 %	8,557 %	-1,292
9	-0,030 %	-2,256 %	3,352 %	6,918 %	1,163
10	0,886 %	-1,371 %	2,872 %	5,435 %	1,632

Appendix 7 BOPP AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T - STATS
-10	-0,093 %	-0,093 %	0,457 %	0,457 %	-0,070
-9	0,034 %	-0,059 %	0,348 %	0,366 %	-0,034
-8	0,426 %	0,367 %	1,238 %	1,301 %	0,083
-7	-0,057 %	0,310 %	3,665 %	4,574 %	-1,663
-6	0,247 %	0,557 %	1,250 %	5,735 %	-0,175
-5	3,983 %	4,540 %	4,449 %	8,552 %	3,231
-4	0,741 %	5,281 %	1,854 %	7,678 %	0,478
-3	0,782 %	6,063 %	0,732 %	7,028 %	0,881
-2	0,366 %	6,428 %	0,450 %	6,979 %	0,301
-1	2,137 %	8,566 %	3,714 %	8,103 %	0,881
0	-2,757 %	5,809 %	4,370 %	6,861 %	-1,229
1	0,339 %	6,148 %	0,537 %	6,704 %	0,407
2	0,252 %	6,399 %	1,792 %	8,129 %	-0,089
3	0,776 %	7,175 %	1,997 %	9,976 %	0,190
4	0,349 %	7,525 %	1,057 %	10,951 %	0,138
5	0,058 %	7,583 %	2,169 %	12,466 %	-0,946
6	0,530 %	8,113 %	0,768 %	13,082 %	0,162
7	1,156 %	9,268 %	2,121 %	13,846 %	1,270
8	-0,831 %	8,438 %	0,893 %	13,077 %	-0,351
9	1,473 %	9,910 %	2,836 %	12,702 %	0,603
10	-0,902 %	9,008 %	1,544 %	11,191 %	-0,313

Appendix 8 CLYD AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T - STATS
-10	0,001 %	0,001 %	0,005 %	0,005 %	0,372
-9	0,001 %	0,002 %	0,005 %	0,010 %	0,441
-8	0,001 %	0,003 %	0,005 %	0,015 %	0,309
-7	0,001 %	0,003 %	0,005 %	0,020 %	0,352
-6	0,001 %	0,005 %	0,005 %	0,025 %	0,443
-5	0,002 %	0,006 %	0,003 %	0,028 %	0,417
-4	-0,001 %	0,005 %	0,006 %	0,033 %	0,013
-3	0,000 %	0,005 %	0,006 %	0,039 %	0,054
-2	-0,001 %	0,004 %	0,005 %	0,045 %	0,107
-1	0,000 %	0,005 %	0,006 %	0,050 %	0,272
0	0,001 %	0,006 %	0,005 %	0,055 %	0,391
1	-0,001 %	0,005 %	0,004 %	0,059 %	0,107
2	-0,001 %	0,004 %	0,005 %	0,064 %	0,054

3	0,000 %	0,004 %	0,004 %	0,067 %	0,223
4	-0,002 %	0,002 %	0,008 %	0,074 %	-0,152
5	-0,001 %	0,001 %	0,005 %	0,080 %	0,025
6	-0,003 %	-0,002 %	0,009 %	0,089 %	-0,272
7	-0,001 %	-0,003 %	0,006 %	0,094 %	-0,027
8	-0,001 %	-0,004 %	0,005 %	0,099 %	0,138
9	0,000 %	-0,004 %	0,004 %	0,104 %	0,109
10	-0,001 %	-0,005 %	0,005 %	0,109 %	0,116

Appendix 9 CLMT AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T - STATS
-10	-0,001 %	-0,001 %	0,006 %	0,006 %	0,127
-9	-0,001 %	-0,002 %	0,006 %	0,012 %	0,237
-8	-0,001 %	-0,003 %	0,006 %	0,019 %	0,076
-7	-0,002 %	-0,006 %	0,005 %	0,024 %	-0,070
-6	-0,001 %	-0,007 %	0,007 %	0,030 %	0,229
-5	-0,002 %	-0,009 %	0,005 %	0,036 %	-0,003
-4	-0,001 %	-0,009 %	0,007 %	0,042 %	0,881
-3	-0,001 %	-0,010 %	0,006 %	0,048 %	0,924
-2	-0,002 %	-0,012 %	0,005 %	0,053 %	0,677
-1	-0,002 %	-0,014 %	0,006 %	0,059 %	0,950
0	-0,003 %	-0,017 %	0,008 %	0,067 %	0,506
1	-0,003 %	-0,020 %	0,008 %	0,074 %	0,753
2	-0,003 %	-0,023 %	0,008 %	0,082 %	0,572
3	-0,003 %	-0,026 %	0,008 %	0,090 %	0,624
4	-0,003 %	-0,029 %	0,007 %	0,097 %	0,365
5	-0,003 %	-0,031 %	0,007 %	0,104 %	0,627
6	-0,003 %	-0,034 %	0,008 %	0,112 %	0,633
7	-0,003 %	-0,037 %	0,008 %	0,119 %	0,432
8	-0,003 %	-0,040 %	0,008 %	0,127 %	0,461
9	-0,003 %	-0,043 %	0,007 %	0,134 %	0,419
10	-0,003 %	-0,045 %	0,007 %	0,141 %	0,516

Appendix 10 CLYD AAR and CAAR within the Event window

DAY	AAR	CAAR	AAR STDEV	CAAR STDEV	T - STATS
-10	-0,204 %	-0,204 %	0,499 %	0,499 %	0,280
-9	-0,013 %	-0,217 %	0,109 %	0,427 %	0,262
-8	0,280 %	0,063 %	0,582 %	0,165 %	0,438
-7	0,062 %	0,124 %	0,117 %	0,115 %	0,663
-6	0,078 %	0,202 %	0,204 %	0,220 %	0,735
-5	0,005 %	0,208 %	0,434 %	0,407 %	0,075
-4	-0,098 %	0,110 %	0,074 %	0,439 %	-0,155
-3	-0,050 %	0,060 %	0,097 %	0,457 %	0,259
-2	-0,009 %	0,051 %	0,074 %	0,502 %	0,477
-1	-0,074 %	-0,023 %	0,100 %	0,562 %	0,115
0	0,008 %	-0,014 %	0,261 %	0,792 %	-0,039
1	-0,043 %	-0,057 %	0,107 %	0,878 %	0,078
2	-0,075 %	-0,132 %	0,087 %	0,945 %	0,612
3	-0,081 %	-0,213 %	0,097 %	1,030 %	1,141
4	-0,051 %	-0,264 %	0,077 %	1,100 %	1,060
5	-0,054 %	-0,318 %	0,085 %	1,149 %	1,019
6	-0,057 %	-0,375 %	0,126 %	1,248 %	1,116
7	-0,055 %	-0,430 %	0,089 %	1,311 %	1,050
8	-0,158 %	-0,588 %	0,180 %	1,483 %	0,524
9	-0,078 %	-0,666 %	0,115 %	1,457 %	0,391
10	-1,166 %	-1,832 %	2,124 %	2,197 %	1,392